RESEARCHES REGARDING THE FERTILIZATION EFFECT UPON THE MAIZE YIELD IN IRRIGATED CROPPING SYSTEM

CERCETĂRI PRIVIND EFECTUL FERTILIZĂRII ASUPRA RECOLTEI LA PORUMB ÎN CULTURA IRIGATĂ

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Abstract: *The crops were done in Greece, in the region Aitoloakarnania, on an alluvial soil having a pH of 7,4 and a humus content of 2,10%. The researched hybrids were Lazaro and Varenne, cultivated on three fertilization levels and three densities. The crop results showed that, by increasing the nitrogen doses from N_{100} to N_{200} on a constant base of $P_{100}K_{100}$, the yield increased with 9%. By increasing the doses to N_{300} the yield increased with 12%. The hybrid Varenne distinguished itself from the other analyzed hybrid, its yield result being 20% higher than the one of the Lazaro hybrid. Among the studied plant densities to remark was the one of 70.000 plants/ha, a variant in which the yield was 13% higher than the variant in which the plant density was of 60.000 plants/ha.*

Rezumat: *Culturile s-au efectuat în Grecia, în zona Aitoloakarnania, pe un sol aluvionar, cu pH 7,4 şi un conţinut de humus de 2,10%. Hibrizii cercetaţi au fost Lazaro şi Varenne, cultivaţi pe trei niveluri de fertilizare şi trei densităţi. Rezultatele de recoltă au evidenţiat că prin mărirea dozei de azot de la N_{100} la N_{200} pe fond constant de $P_{100}K_{100}$ recolta a crescut cu 9%. Mărirea dozei de la N_{300}, a amplificat valoarea sporului la 12%. Dintre hibrizi s-a remarcat Varenne la care recolta a fost cu 20% superioară hibridului Lazaro. Dintre densităţile studiate s-a remarcat cea de 70.000 plante/ha, variantă în care recolta a fost superioară variantei cu 60.000 plante/ha cu 13%.*

Key words: *maize grains, irrigation, hybrids, fertilization.*
Cuvinte cheie: *porumb boabe, irigare, hibrizi, fertilizare.*

INTRODUCTION

The maize cultivation in the researched area from Greece is only possible in irrigated cropping system, because starting with Mai the drought starts and the lack of rain lasts during the entire maize vegetation period. In irrigated cropping system and by using an adequate technology, the yield might exceed 10 t grains/ha. The crop consists of many hybrids originating from different lands, having different vegetation periods and being not always adequate to the climate of Greece.

This is why studies must be done in order to establish the hybrids' structure and the main technological chains specific to maize cultivation.

MATERIAL AND METHODS

One of the studied hybrids was Lazaro, a hybrid of Spanish origin belonging to the FAO 400 precocity group.

Another studied hybrid was Varenne, a later hybrid having its origin in France and belonging to the FAO 600 precocity group.

The experiment was trifactorial and organized according to the subdivided plots method, with three repetitions and the following factors' graduations:

The A factor – the agrifond – ($N_{100}P_{100}K_{100}$; $N_{200}P_{100}K_{100}$; $N_{300}P_{100}K_{100}$);

The B factor – the plant density (plants/ha) – 60.000; 70.000; 80.000);

The C factor – the cultivated hybrid (Lazaro; Varenne);

The obtained results are expressed in kg grains/ha, the humidity being of 15%.

RESULTS AND DISCUSSION

The crop results are given in Table 1.

We notice that the yields obtained in the researched field were of between 11.300 kg/ha and of over 17.600 kg/ha

The nitrogen fertilizers favourably influenced the yield of the two hybrids. By increasing the doses from N_{100} to N_{200} on a constant base of $P_{100}K_{100}$ the yield increased with 9% and by increasing the doses to N_{300} the increase was of 12%. The yield differences are very significant.

Tabelul 1

The maize grain yield obtained in Greece
- Irrigated Cropping System –

A Factor Agrifond	B Factor Density pl./ha	C Factor The hybrid		The averages of the A factor			
		LAZARO (FAO 400)	VARENNE (FAO 600)	Yield kg/ha	%	Difference kg/ha	Signification
A_1	60.000	11343	13740	13389	100		
	70.000	13320	16393				
	80.000	11829	13713				
A_2	60.000	12147	15507	14641	109	1252	xxx
	70.000	14401	17057				
	80.000	13087	15653				
A_3	60.000	13318	16462	15081	112	1692	Xxx
	70.000	15259	17622				
	80.000	12518	15310				

DL5% = 278 kg/ha DL1% = 438 kg/ha DL0,1% = 798 kg/ha

The averages of the C factor – the hybrid

Specification	LAZARO (FAO 400)	VARENNE (FAO 600)
Yield kg/ha	13024	15717
%	100	120
Difference kg/ha		2693
Signification		XXX

DL5% = 236 kg/ha DL1% = 319 kg/ha
DL5% = 137 kg/ha DL1% = 178 kg/ha
DL0,1% = 433 kg/ha

The averages of the B factor – the density pl/ha

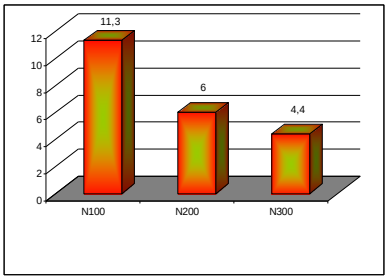
Specification	60.000	70.000	80.000
Yield kg/ha	13752	15675	13685
%	100	113	99
Difference kg/ha		1923	-127
Signification		XXX	

DL0,1% = 224 kg/ha

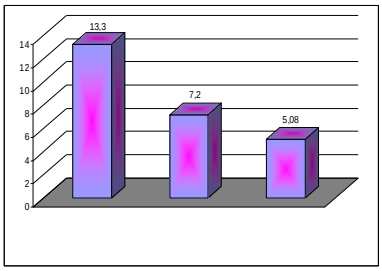
The plant density increase from 60.000 to 70.000 determined the yield increase with 13%. The plant density increase to 80.000 plants/ha is not justified, as the yield obtained is equal to the one obtained for the variant having the density 60.000 plants/ha.

Among the hybrids we noticed the hybrid Varenne. The yield obtained for this hybrid was 20% higher, respectively 2693 kg/ha more than the one obtained for the hybrid Lazaro.

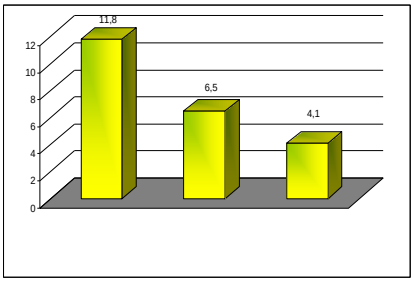
The yield increase obtained for 1 kg N s.a. applied on a base of $P_{100}K_{100}$ varied according to the hybrid and to the density between 4,1 kg grains ($N_{300}P_{100}K_{100}$ – plant density: 80.000 plants/ha) and 13.3 kg grains ($N_{100}P_{100}K_{100}$ – plant density: 70.000 plants/ha) for the hybrid Lazaro and between 5,1 kg grains ($N_{300}P_{100}K_{100}$ – plant density: 80.000 plants/ha) and 16.4 kg grains ($N_{100}P_{100}K_{100}$ – plant density: 70.000 plants/ha) for the hybrid Varenne.



P100K100
60.000

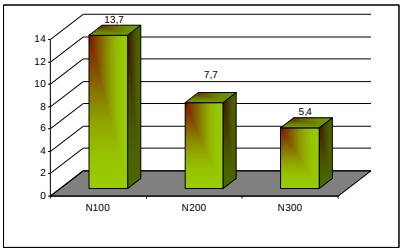


P100K100
70.000

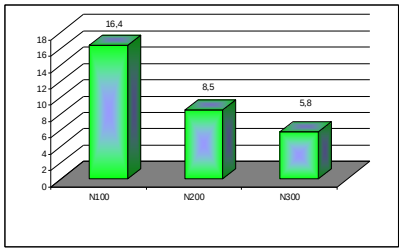


P100K100
80.000

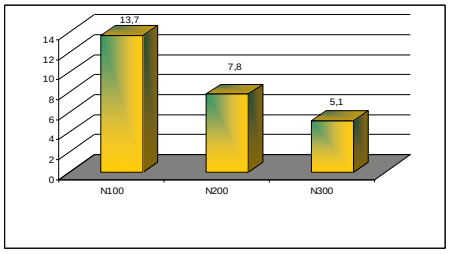
Figure1. The increase in grains/1 kg N s.a. according to the density and to the doses applied to the hybrid Lazaro



P100K100
60.000



P100K100
70.000



P100K100
80.000

Figure 2. The increase in grains /1 kg N s.a. according to the density and to the doses applied to the hybrid Varenne

CONCLUSIONS

1. The Lazaro and Varenne hybrids are adapted to the region they were cultivated and realized economically motivated yields.

2. The nitrogen fertilizers were good valued, the yield increase in the variants fertilized with N_{200} and N_{300} as compared to the variant fertilized with N_{100} being of 9% and respectively of 12%.

3. The optimal plant density in the conditions of irrigated cropping system is of 70.000 plants/ha.

4. The yield registered for the Varenne hybrid was 20% higher than the one registered for the Lazaro hybrid.

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